

16. HALLIER, H. Vorläufiger Entwurf des natürlichen (phylogenetischen) Systems der Blütenpflanzen. Bull. Herb. Boissier ser. 2, vol. 3: 306-317. 1903.
17. ———. Über die Lennoeen. . . . Bot. Centralbl. Beih. 40²: 1-19. 1923.
18. HUTCHINSON, J. The families of flowering plants. I. Dicotyledons. London, 1926.
19. DE JUSSIEU, A. L. Genera plantarum secundum ordines naturales disposita. Paris, 1789.
20. KRIBS, D. A. Salient lines of structural specialization in the wood rays of dicotyledons. Bot. Gaz. 96: 547-557. 1935.
21. LINNAEUS, C. Genera plantarum. . . . sixth edition. Stockholm, 1764.
22. LOTSY, J. P. Vorträge über botanische Stammesgeschichte. vol. 3¹. Jena, 1911.
23. POOL, R. J. Flowers and flowering plants. . . . New York, 1929.
24. SCHNARF, K. Vergleichende Embryologie der Angiospermen. Berlin, 1931.
25. SWINGLE, D. B. A textbook of systematic botany. New York, 1934.
26. THOMAS, H. H. The Caytoniales, a new group of angiospermous plants from the Jurassic rocks of Yorkshire. Phil. Trans. Roy. Soc. B 213: 299-364. 1925.
27. TIPPO, O. Comparative anatomy of the Moraceae and their presumed allies. Bot. Gaz. 100: 1-99. 1938.
28. TREUB, M. Sur les Casuarinees et leur place dans la système naturel. Ann. Jard. Bot. Buitenzorg 10: 145-231. 1891.
29. VESTAL, P. A. The significance of comparative anatomy in establishing the relationship of the Hypericaceae to the Guttiferae and their allies. Philippine Journ. Sci. 64: 199-256. 1938.
30. WIELAND, G. R. American fossil cycads. Carnegie Inst. Publ. 34. 1906.

STUDIES IN WESTERN VIOLETS—III

MILo S. BAKER

The investigation of certain problems concerning the violets of the Pacific Northwest called for field study; to this end during the month of June, 1938 and 1939, trips were taken through western Oregon, Washington and British Columbia to visit the localities in which the problems centered.

VIOLA OCELLATA Torr. & Gray. Through correspondence with Mrs. Cora Ollivant I had learned that *Viola ocellata* had been collected in the vicinity of Looking Glass Post Office, a few miles southwest of Roseburg, Oregon, on the ranch of Thomas Ollivant. This is a matter of interest to students of *Viola* since this species was not known with certainty to grow in Oregon, its most northern known limits being northern Humboldt County and central Shasta County in California. In Gray's "Synoptical Flora," published in 1897, it was stated that this violet had been collected in the Cow Creek Mountains of Oregon, but diligent inquiry on my part had until now failed to confirm this report. On a hillside at a distance of less than a mile from the ranch house there was a colony of this violet. Although not covering a wide area here, the colony was flourishing and the individuals appeared very similar to typical California plants. Both transplants and herba-

rium specimens (June 19, 1938, *Baker 9033*) were secured. The Ollivants assured me that they had collected this species also on Sugar Pine Mountain about five miles west by air line from their ranch. They had also noted its occurrence on another mountain near there. Thus it appears that *Viola ocellata* is well established in that region. This occurrence suggests that sometime in the remote past this violet had a continuous distribution southward through Oregon and northern California to its present range in Shasta and Humboldt counties but that, for some reason, presumably environmental, it has now disappeared from a strip several hundred miles wide in southern Oregon and northern California.

VIOLA LANCEOLATA L. Several years ago, Dr. George Neville Jones collected a very diminutive white marsh violet near Parkland, Washington (*Jones 8803*). A note was published by him in *Madroño* (4: 35. 1933) referring it to *V. lanceolata* L., a species known hitherto only in the eastern and central United States. My first thought was that he must be mistaken as to its identity. However, after examining Jones' material, I was convinced of the correctness of the identification. A search of the Parkland region proved unavailing. Dr. Jones, however, had collected another specimen of larger stature near Sea View, Washington (*Jones 2115*). The next day I went to the mouth of the Columbia River in search of *Viola lanceolata* along the marshes back of the town of Sea View. Here in a pasture about one mile north of town I found thousands of plants in good flower. The owner of the pasture came along at noontime and found a strange man digging up his land! However, after explanations he was sympathetic and bade me take all of this worthless weed that I wanted. It appears that *Viola lanceolata* is a pest in the cranberry bogs of this region and yet only one botanist was aware of its existence on the Pacific Coast. The species occurs in at least three spots near Long Beach and Sea View, Pacific County, Washington (June 25, 1938, *Baker 9055*), and I have no doubt that it can be re-located in the region about Tacoma and Parkland if searched for at the proper season. Indeed, Dr. Jones wrote me that he had collected it at several stations east and south of Tacoma.

A trustworthy explanation of this strange quirk in the distribution of *Viola lanceolata* is not yet forthcoming. To the eastward the species is unknown except in the region of the Great Lakes and farther east and south. Since it is a low altitude marsh plant it could not have migrated across the Rocky Mountains; yet the western plant is typical in all respects except in the small size of its seeds. In the absence of any verified explanation I shall venture a guess as to the origin of these plants, although, frankly, I have little evidence to support this speculation. It is known that *Viola lanceolata* grows in Venezuela. It is also known that

we have along our coast line a number of coastal species of South America. At the present writing, I have in mind *Fragaria chilensis* L., *Aster chilensis* Nees, *Madia sativa* Molina, *Lupinus densiflorus* Benth., all of which are fairly common along the Sonoma County, California, coastline. One explanation of the presence of these Chilean species along our own coast is that the seeds were brought here by migratory water fowl. It is common knowledge that thousands of individuals of water fowl including many different species, annually fly northward along our coast, and it is reasonable to suppose that small seeds, particularly of marsh plants, could be easily carried in the mud adhering to the feet of these migratory birds. If the mud or clay were sufficiently adhesive, it seems to me entirely credible that such seeds could be carried even from South America and deposited in the marshes as far north as the Columbia River and Tacoma.

Viola superba sp. nov. Radices in plantis maturis, adventitiae; herba glabra; caules erecti adscendentes, 25 mm. longi; caulium et rhizomatis internodia longitudine variabiles, 1-9.5 cm. longa; foliorum lamina conspicue venata rotunda ovato-cordata, 3.5-4.8 cm. lata, 3-5.2 cm. longa, regulariter serrato-crenata, serrae utrimque 12 ad 14, clare apiculata, sulco in foliis maturis circa 13 mm. alto; foliorum maturorum petioli crassi, .5-22 cm. longi; pedunculi crassi, 5-16.5 cm. longi; bracteolae ovatae lanceolatae adpressae, 2-3 mm. longae, supra medium pedunculi insertae; sepalum inferius ovatum, alteri elliptici obtusi scarisomarginati, 5-6 mm. longi; corolla purpurea ei *V. Langsdorffii* subaequalis; flori sicci 2.5 cm. diametro; petala superiora laminis suborbicularibus, lateralia leviter barbata, inferiora nuda, apice paullo retuso, 1.4 cm. lata, 2 cm. longa, calcare incluso; calcar conicum eburneum, 2 mm. diametro, 2 mm. longum; stylus crassus; foramen circa 5 mm. diametro; capsulae oblongo-ellipticae, 12 mm. longae; semina atro-fulva, 1.5 mm. lata, 2.3 mm. longa, pondere 2.3 mg., caruncula .57 longa seminum haud excedente.

Roots adventitious in mature plants as in *Viola simulata* and *V. Langsdorffii* but fewer, larger and more woody; whole plant entirely glabrous; stems erect or ascending, 2-25 cm. long; internodes variable apparently according to season, 1-9.5 cm. long; root-stocks or buried stems of former years with the same variable length of internodes; leaves conspicuously veined, rounded, ovate-cordate, distinctly apiculate, sulcus deep, averaging 13 mm. in mature leaves, evenly serrate-crenate, 12 to 14 serrations on each side of leaf, width and length approximately equal, 3.5-4.8 cm. wide, 3-5.2 cm. long; petioles of mature leaves stout, 5-22 cm. long; stipules ovate to lanceolate, entire, becoming scarious, 7-10 mm. long; peduncles stout, 5-16.5 cm. long; bractlets slightly above the middle of peduncle, ovate to lanceolate, appressed, 2-3 mm. long; lower sepal ovate, others elliptical, obtuse, scarious

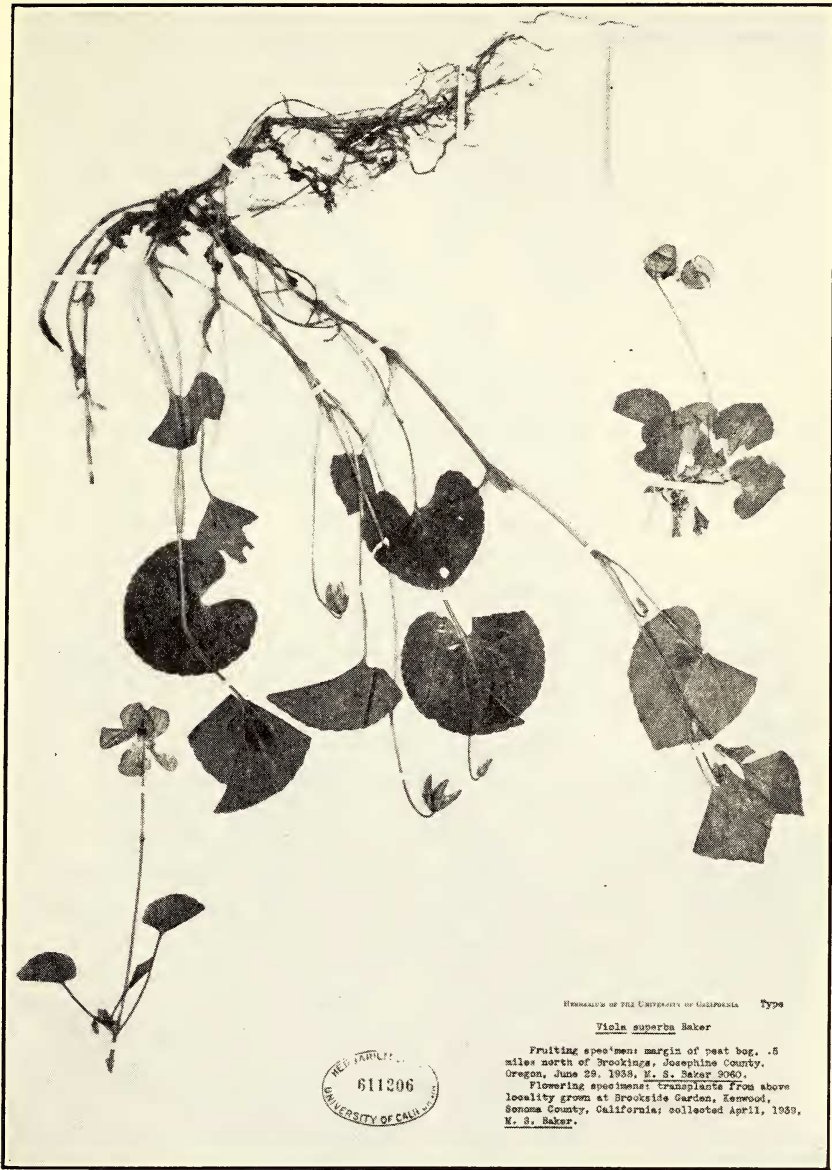


PLATE 20. *VIOLA SUPERBA* BAKER. Photograph of type $\times .37$ (University of California Herbarium, Berkeley, no. 611206).

margined, 5–6 mm. long; corolla purple, as large as in *V. Langsdorffii*, dried flowers measuring 2.5 cm. in diameter; all petals rounded, the limb in upper petals as wide as long, the lower petal naked, slightly retuse at tip, 1.4 cm. wide at tip, 2 cm. long, including the cream colored conical spur, *ca.* 2 mm. in diameter, 2 mm. long; lateral petals lightly bearded; anterior appendages of stamens reddish tan, closely fitting the massive style, foramen unusually large, approximately .5 mm. in all diameters; capsules oblong-elliptical, up to 12 mm. long; seeds dark tan with a darker line along the raphe, 1.5 mm. wide, 2.3 mm. long, average weight *ca.* 2.3 mg., caruncle one-fourth length of seed, scarcely extending beyond seed point.

Type. Near Brookings, Josephine County, southern Oregon, June 29, 1938, *M. S. Baker 9060*, University of California Herbarium no. 611206.

In the spring of 1938 Dr. Doris Gillespie of Humboldt State Teachers College, Arcata, California, sent me specimens of a violet collected near Brookings, Josephine County, Oregon. I re-collected this violet in a peat bog just north of the town of Brookings. The highway had been cut through the marsh and there were a few of these violets growing on each side of the road. The individuals were very limited in number and I was unable to discover any plants other than those in this small bog.

This violet is closely related both to *Viola simulata* Baker and *V. Langsdorffii* Fischer. The habitat of all three species appears to be much the same, moist places near the ocean; they also agree in being entirely glabrous, devoid of stolons and more or less caulescent. The leaves of the three species closely resemble each other and each species has large purplish flowers. However, the pistils are quite different (pl. 22) and the extent of the caulescence varies greatly; there are also differences in stipules and rootstocks, in the form of the spurs, and in seed characters.

Specifically *Viola superba* can be distinguished from *V. Langsdorffii* by a widely different stigma, by more apiculate leaves with a deeper sulcus, and by stouter and fewer roots. It differs from *V. simulata* in possessing a more massive pistil with a stigma of different shape (Madroño 3: 239, pl. 11), much longer, erect or ascending stems, much larger stipules, larger flowers and stouter, fewer roots.

Except in the characters of the stigma, *Viola superba* seems closer to *V. Langsdorffii* than to *V. simulata*; it possesses erect or ascending stems as does the Langsdorff violet, its stipules are identical, and its flowers are fully as large and as beautiful. Unquestionably these two species have the largest purple flowers in North America and, in my opinion, also the most beautiful.

Although *Viola superba* has never been collected elsewhere, it is probable that it hails from the north and that the Brookings location is its most southerly limit. It is probably a relict, since

a plant with such striking flower could scarcely be overlooked if abundant anywhere. Farther north the species may exist but, since it could easily be confused with *V. Langsdorffii*, may have escaped collection. If this is true we may expect a collection sooner or later.

VIOLA BELLIDIFOLIA Greene subsp. **typica** nom. nov. *V. bellidifolia* Greene, *Pittonia* 4: 292. 1901.

In Madroño (3: 1. 1936) I expressed the opinion that later investigations might show *Viola bellidifolia* to be only a subspecies of *V. adunca*. Since that date I have obtained preserved flowers of *V. bellidifolia* from Poudre Lake, Colorado, and I find the characters of the pistil quite different from those of *V. adunca*. In the latter, the stigmatic tube and foramen are much smaller in diameter than the head, while in *V. bellidifolia* the stigmatic tube and foramen are scarcely smaller in diameter than the head itself. Also, in *V. bellidifolia* the direction of the beak has a fixed angle with the style, while in *V. adunca* this angle varies widely in different forms. These pistil differences of the two plants added to the differences in leaf outline fully justify *V. bellidifolia* as a distinct species.

VIOLA BELLIDIFOLIA Greene subsp. **valida** subsp. nov. A subsp. *typica* differt, foliis maturis maioribus elongatis, pedunculis elongatis.

Plants in the flowering stage tufted, 3–6 cm. high from a branched rootstock, springing from a slender but deep-seated yellowish tap root; type glabrous throughout but plants at other localities somewhat pubescent; early leaves mainly short-ovate, occasionally nearly round, or even wider than long, truncate to sub-cordate at base, obscurely serrate, obtuse at apex, 9–20 mm. long on petioles 1.5–4 cm. long; stipules inconspicuous, linear, faintly toothed, 2–3 mm. long; stems extremely short; mature leaves greatly enlarged and elongated, truncate at base or even slightly cuneate, obscurely serrate, 2.0–4.3 cm. long, 1.4–2.5 cm. wide, some being twice as long as wide, on petioles 2.5–8 cm. long; stipules scarcely longer than in early stage; stems in mature plants elongated occasionally to 8 or 9 cm.; flowers large for so small a plant, pale to dark lavender, somewhat exceeding the leaves, ca. 18–20 mm. in diameter; sepals lanceolate, acute, 5 mm. long (including auricle 1 mm. long), 1.5 mm. wide at base; upper petals obovate, 9 mm. long, 8 mm. wide, lateral petals narrower, 10 mm. long, 6 mm. wide, spur petal broad, obovate, 10 mm. wide at distal end, 10 mm. long, narrowed to a cylindric spur 8 mm. long and deeply notched at distal end; style exerted 0.6 mm. from stamen sheath, form of head and beak as in *V. bellidifolia* subsp. *typica*, beards on head of style very short with a wide base (pl. 22); seeds brown, 1.7 mm. long, 1.2 mm. wide, average weight 0.8 mg., caruncle as in *V. adunca* Smith.

Types. Brighton, Salt Lake County, Utah, July 18, 1936, *M. S. Baker 8519* (in fruit), University of California Herbarium no. 624296; June 13, 1939, *M. S. Baker 9367* (in flower), University of California Herbarium no. 624295.

This subspecies differs from the subsp. *typica* in its mature leaves which are not only greatly enlarged in all diameters and on much elongated peduncles, but have a changed outline due to a much greater increase in the length than in the width of the blades. In the flowering stage subsp. *valida* might easily pass for subsp. *typica* although the early leaves are somewhat more elongated, while the late seasonal stage might pass for a glabrous or glabrate form of *V. adunca*.

VIOLA UNCINULATA Greene, Leaflets 2: 97. 1910. This species, closely related to *V. bellidifolia*, was described by Greene from material collected in Crater Lake National Park by Mr. Elmer Aplegate. Like *V. bellidifolia*, the plant is entirely glabrous and the leaf, though larger, is identical in form. The beak and the stigmatic foramen are very different (pl. 22). Moreover, *V. uncinulata* grows in a lower life zone than does *V. bellidifolia* and is confined to a limited area in central and southern Oregon. For these reasons, I regard *V. uncinulata* as a valid species belonging to cenospecies *V. adunca* Smith.

VIOLA SEMPERVIRENS Greene subsp. *typica* nom. nov. *V. sempervirens* Greene, Pittonia 4: 8. 1899.

VIOLA SEMPERVIRENS Greene subsp. *orbiculoides* subsp. nov. A subsp. *typica* differt, herba nana, ramis brevibus adscendentibus non radicantibus.

Type. In forest above the foot of Nisqually Glacier, Mount Rainier, Washington, elevation 4500 feet, July, 1924, *M. S. Baker 736*, University of California Herbarium no. 624808.

Other collections. Mount Angeles, Clallam County, Washington, September, 1924, *Baker 865*; Mount Arrowsmith, Vancouver Island, British Columbia, August 28, 1938, *Baker 926*.

This subspecies differs from subsp. *typica* in being a dwarf having its few short stems ascending instead of prostrate and rooting. It may be distinguished from *Viola orbiculata* Geyer, which it resembles, by the character of its leaves; those of the latter being larger, thinner and more nearly circular. The leaves of *V. sempervirens* subsp. *orbiculoides* are much thicker and are similar to those of subsp. *typica*.

During the summer of 1924 I found on Mount Rainier at higher elevations ranging from 3000 to 7000 feet, a violet which seemed in all characters to represent *Viola orbiculata* Geyer. It was similar to *V. sempervirens* Greene in leaves, flowers, fruits and seeds but differed in having short, erect or ascending stems while *V. sempervirens* has prostrate, rooting stems which branch freely and may extend to considerable distances in all directions. At



PLATE 21. *VIOLA BELLIDIFOLIA* SUBSP. *VALIDA* BAKER. FIG. 1. Early seasonal stage. FIG. 2. Late seasonal stage.

lower elevations I found everywhere on Mount Rainier (Longmire Springs, August 7, 1924, *Baker 776*), Mount Angeles and Mount Arrowsmith an abundance of *V. sempervirens*. Above the foot of Nisqually Glacier, Mount Rainier, at an elevation of approximately 4500 feet, I secured a single plant (*Baker 736*) of this dwarf form which, transplanted to my garden near Kenwood, Sonoma County, California, in the course of several years produced a mat of many interlacing stems each of which bore numerous adventitious roots (*Baker, 4151, 5547*). In other words, it developed into a colony of plants which could not be distinguished from *V. sempervirens*. Therefore, I was convinced that *V. orbiculata* differed only varietally or subspecifically from *V. sempervirens* and that the short, non-rooting stems resulted from the short growing season of higher altitudes. However, in the summer of 1939 I discovered in a forest a few miles north of Sandpoint, Idaho, at an elevation of only 2000 feet, an abundance of plants of *V. orbiculata* with short non-rooting stems even though the growing period was sufficiently extended to allow them to produce rooting stems (June 20, 1939, *Baker 9422*). It thus appears that these two similar non-rooting forms, one from the upper altitudes of the coastal mountains of Oregon, Washington and British Columbia and the other at varying altitudes in eastern Oregon, Washington, Montana, and inland British Columbia, have a different origin and represent different species, though morphologically they are difficult to distinguish.

Viola McCabeiana sp. nov. Herba acaulescens, rhizoma elongatum, tenue; lamina foliorum primorum saepe purpureo-tincta, rotundo-cordata, apice haud acuta, 1.5–2.7 cm. lata, 1.3–2.5 cm. longa; lamina foliorum tardiorum conspicue elongata serrata, apice acuta; pedunculi crassi, 7–19 cm. longi, supra medium bracteolis glanduloso-dentatis instructi; sepalia oblongo-lanceolata obtusa integra, marginibus scariosis, apice conspicue calloso; auriculae haud 1 mm. longae; corolla 15–25 mm. diametro, purpureo-caesia medio pallidiora; petalum inferiorum barbatum spatulatum emarginatum, 7 mm. latum, 16 mm. longum, calcar incluso; calcar obtusum flavum, 3 mm. latum, 2.5 mm. longum; petala lateralia anguste obovata barbata, petalum superiorum anguste obovatum, circa 6 mm. latum, 13 mm. longum; stylus clavato-capitellatus, fere 3 mm. longus, tuba stigmatosa extrorsa deorsum extendente; foramen ellipticum, .2 mm. altum, .3 mm. latum; semina fusca minute punctata, 1.2 mm. lata, 2.2 mm. longa, caruncula seminum leviter excedente inclusa.

Acaulescent; rootstock elongated, slender, much as in *Viola palustris* but not originating from stolons; early leaf blades small, round-cordate, regularly crenate, scarcely pointed at apex, often purple tinted, 1.5–2.7 cm. wide, 1.3–2.5 cm. long; later leaves conspicuously elongated with a sharpened apex and serration; stipules during early spring conspicuous, protecting the buds,

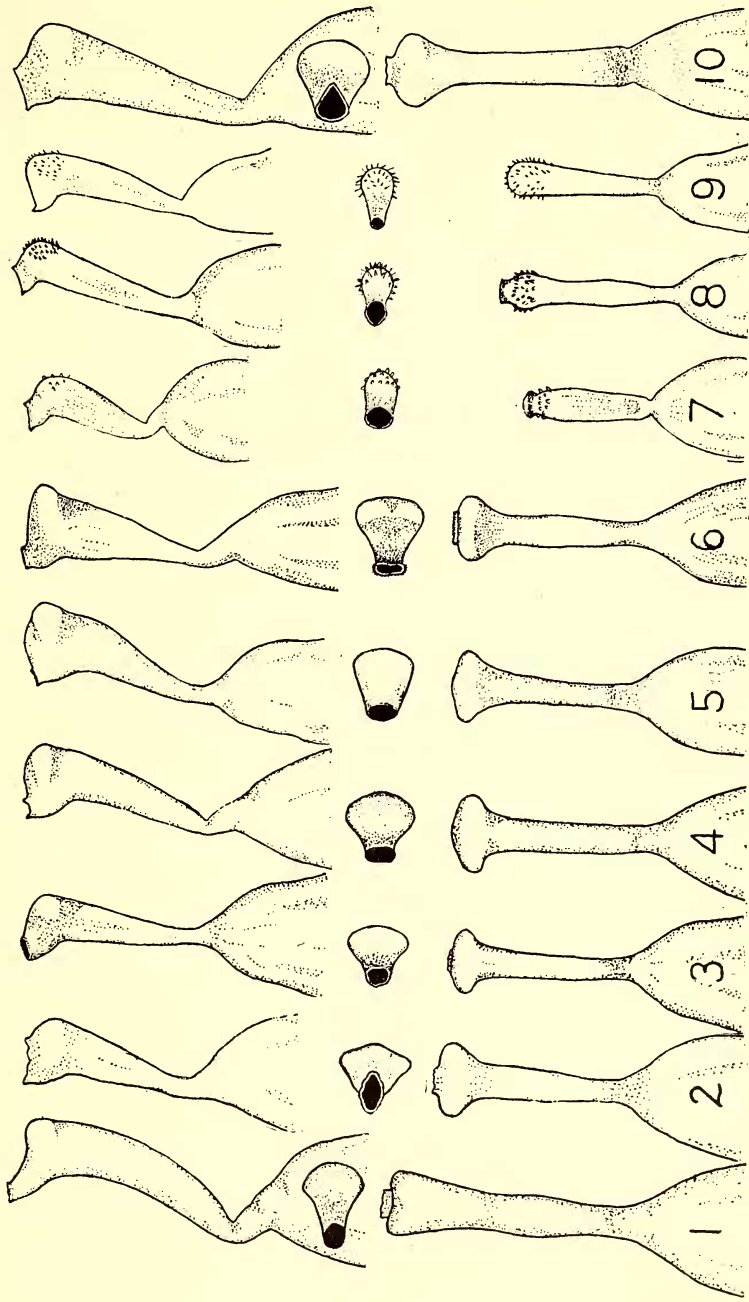


PLATE 22. PISTILS OF VIOLA. Side, front and dorsal views: 1, *V. Langsdorffi*; 2, *Clauseniana*; 3, *V. cognata*; 4, *V. arizonica*; 5, *V. McCabeana*; 6, *V. nephrophylla*; 7, *V. bellidifolia* subsp. *typica*; 8, *V. bellidifolia* subsp. *valida*; 9, *V. uncinulata*; 10, *V. superba* (all $\times 10$).

later becoming scarious and disappearing, ovate to oblong-lanceolate, irregularly toothed, 6–8 mm. long; peduncles stout, 7–19 cm. long with linear-lanceolate, glandular toothed bractlets mostly above the middle, 2–4 mm. long; sepals oblong-lanceolate, entire, scarious margined, obtuse, the callous tip conspicuous; auricles small, scarcely 1 mm. long; corolla variable in size, 15–25 mm. in diameter, purplish-lavender with lighter center; lower petal bearded, spatulate, emarginate at end, 7 mm. wide, 16 mm. long, including the blunt, yellowish spur, 3 mm. wide, 2.5 mm. long; lateral and upper petals narrowly obovate, the former bearded, *ca.* 6 mm. wide, 13 mm. long; stamens with tan-colored anterior appendages closely fitted around style; two lower stamens having a posterior appendage projecting backwards and downwards 2 mm. into the spur; style nearly 3 mm. long, ending in a club shaped head; stigmatic tube short, pointing downward and outward, foramen elliptical, .2 mm. high, .3 mm. wide; seeds brown, minutely speckled, 1.2 mm. wide, 2.2 mm. long, including the caruncle which projects *ca.* .2 mm. beyond point of seed.

Types. Southeast corner of Columbia Lake, Kootenay District, British Columbia, May 21, 1938, *T. T. McCabe 6149*, University of California Herbarium no. 612591, May 28, 1938, *T. T. McCabe 6363*, University of California Herbarium no. 633210; cotype, Canal Flats, Columbia Lake, June, 1939, *M. S. Baker 9444*, Herbarium of M. S. Baker.

This violet came first to my attention from a collection made, July 9, 1933, by Mr. Thomas T. McCabe at Indianpoint Lake, Caribou District, British Columbia (*303*). In 1934 he collected the same species at two other points, both near Indianpoint Lake (*1115*, *1226*). This region lies along the western slopes of the Canadian Rockies about three hundred fifty miles by air line north of the United States border. In the summer of 1938 Mr. McCabe collected the same violet south of Kinbasket Lake, British Columbia (*6263*), also at Columbia Lake, Kootenay District, only eighty miles by air line from the boundary of Montana (*6149*, *6363*). Columbia Lake marks the beginning of the Columbia River which flows nearly north at this point.

During June, 1939, I visited the spot at Columbia Lake where Mr. McCabe made his collections. Near the home of Mr. Charles Edwards there is a woodland bog quite above the lake. In this bog Mr. McCabe made his two collections and here my collection was made (*M. S. Baker 9444*). The violets were growing out in the bog and were difficult to collect. My recollection is that peat moss was growing there. At any rate, the grassy surface shook at every step. On all sides there is heavy timber and brush, and little direct sunlight reaches the surface; hence the petioles and peduncles of this violet are unusually long, one leaf extending 30 centimeters, and a young fruit 20 centimeters, above the surface (*M. S. Baker 9444*). However, on the ranch of Mr. Prust across the lake on the west side there is a colony of the same species in

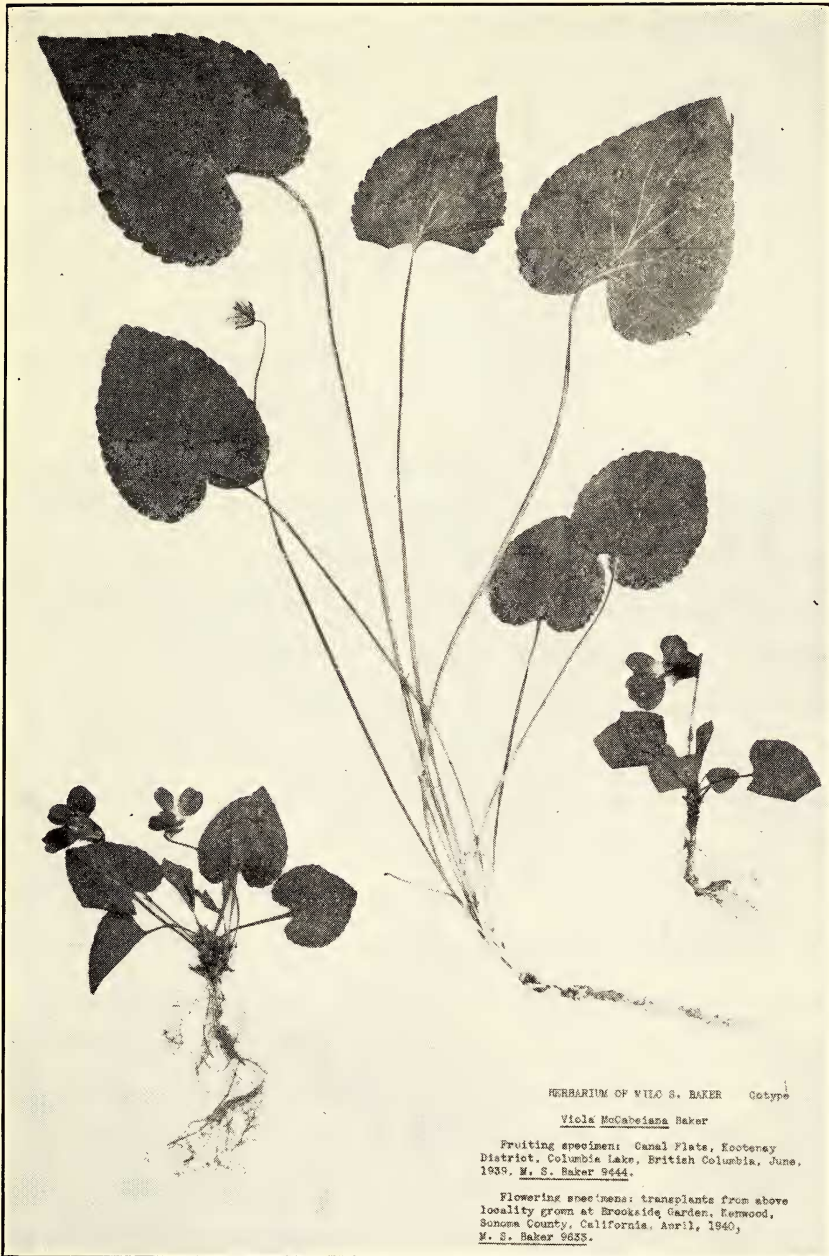


PLATE 23. *VIOLA MCCABELLANA* BAKER. Photograph of cotype $\times .4$ (M. S. Baker Herbarium, Kenwood, California).

a wet, grassy spot. This is an easterly and southerly exposure only thinly wooded and, due no doubt to an abundance of light, the height of leaves and flowers is much less. In this locality all petioles and under surfaces of leaves are conspicuously purple-tinted. I have noted the same tinting in the early leaves of *Viola cognata* Greene in Estes Park, Colorado.

Viola McCabeiana is most closely related to *V. prionosepala* Greene which was named in 1902 from a collection of the Canadian Survey (Chelsea, Quebec, *J. M. Macoun, 1897?*). In appearance *V. prionosepala* and *V. McCabeiana* are very similar, both having long slender rootstocks, greatly elongated and sharply pointed later leaves and the spur petal distinctly bearded with unusually long hairs. They differ in the sepals, the pubescence and purple tinting of the leaves. In *V. prionosepala* the margins of the sepals are regularly and closely serrulate, a character entirely lacking in *V. McCabeiana*. In *V. prionosepala* the upper leaf surface is supplied with short appressed hairs, much as in *V. blanda* Willd. In *V. McCabeiana* at both stations about Columbia Lake the leaves are practically glabrous, although a diligent search with a good lens may uncover a few short hairs of the same character as in *V. prionosepala*. McCabe's specimens from Indianpoint Lake show a slight amount of pubescence on the upper leaf surface. The five sheets of *V. prionosepala* examined showed no trace of purple tinting on the lower leaf surface. The configuration of the stigma of *V. prionosepala* is unknown and must be until fresh or properly preserved flowers are obtainable.

Both of these species are unique in the group of Boreali-Americanae in possessing very slender, often greatly elongated rootstocks; all other members of this group have short and thickened rootstocks. However *Viola arizonica* Greene and *V. Clauseniana* Baker are two partial exceptions, each of these species showing a tendency towards slenderness of rootstocks. Both have two other characters in common with *V. McCabeiana* and *V. prionosepala*: the foliage is slightly pubescent and the later leaf-blades acute and elongate. *Viola arizonica* also grows in the same life zone as does *V. McCabeiana*. I have collected it in Pine Valley and near Navajo Lake in southern Utah, where it occupies the upper Transition zone. Moreover its style and stigma are of the same type, though not so massive, as is found in *V. McCabeiana* (pl. 22). These resemblances seem to indicate a genetic relationship and possibly a common origin. On the other hand the pistils of *V. Clauseniana* and *V. McCabeiana* are of a different type (pl. 22) and thus in spite of the foregoing resemblances indicate a different origin.

In discussing affinities of this violet, one should perhaps consider two other species, *Viola cognata* and *V. nephrophylla* both named by E. L. Greene. Two British Columbia collections (Vaseaux Lake, *McCabe 5874*; south of Kinbasket Lake, *McCabe*

6263) are very similar to *V. cognata* and would pass for that species in this early stage were it not for a vestige of pubescence on one of the maturer leaf-blades. The fact that both species have purple-tinted leaves during the early spring growth adds to the difficulty in distinguishing them before leaf blade elongation has started. The pistils, however, differ widely (pl. 22) and thus make identification certain when flowers are available. *Viola nephrophylla* occupies a lower life zone, possesses a different rootstock, is entirely without pubescence of any kind as well as without purple tinting of leaves. However, the character of the pistil (pl. 22) shows a somewhat close relationship with *V. McCabeiana*.

Santa Rosa Junior College,
September 8, 1939.

DR. SETCHELL AND ALASKA WILLOWS

CARLETON R. BALL

A phycologist went willow-wise. In 1931, while the writer was with the University of California, Dr. William A. Setchell, then head of the Department of Botany and sixty-seven, planned a summer trip to Alaska with Mrs. Setchell. He decided to collect willows exclusively. What willows were known from Alaska? He looked at herbarium specimens—made mental photographs. What other willows might occur in Alaska? He looked at more herbarium specimens. Said of one (*Salix pseudomonticola* Ball), "It looks like a service-berry" (*Amelanchier*). It does.

In the two summers of 1931 and 1932 Dr. and Mrs. Setchell brought back 619 numbers of willows from Alaska and the Yukon. These contained twenty-one species out of some twenty-four then known to occur in Alaska, as well as many of their varieties. That was remarkable in itself, when we remember that Dr. Setchell travelled only three major north-south routes and the Yukon River. Of the three species he did not get, *Salix ovalifolia* does not occur in the area he covered and *S. polaris* and *S. stolonifera* are rare and of local occurrence.

More remarkable still was the fact that he brought back abundant collections of five species not previously known from Alaska. These were *Salix anglorum* Chamisso, *S. Barrattiana* Hooker (represented by var. *angustifolia* And.), *S. albertana* Rowlee), *S. lasiandra* Benthham (represented by var. *lancifolia* (And.) Bebb), *S. pseudomonticola* Ball, and *S. Setchelliana* Ball. The latter, from the snout of the Muldrow Glacier, in Mount McKinley National Park, was new to science and has been found at only two other localities.

His collections added two other varieties not previously known from Alaska and provided material of what later were described as three new varieties, all previously collected by others. He